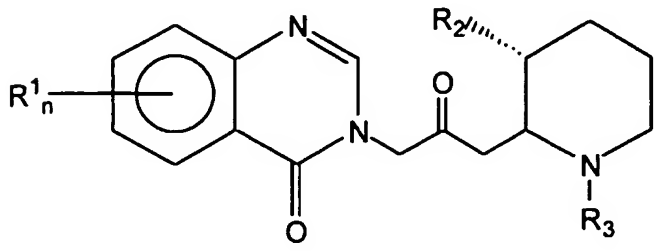
CLAIMS:

1. A method for improving liver regeneration comprising administering to an individual in need thereof a pharmaceutical composition comprising a therapeutically effective amount of a compound having the formula:



wherein: n=1-2

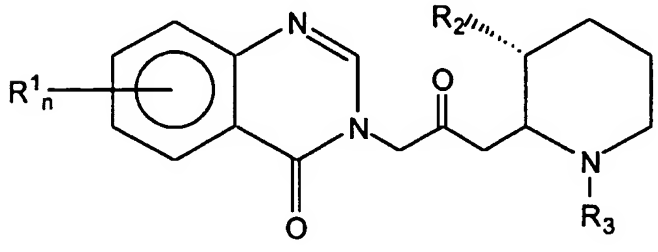
R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;

R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and

R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl, and pharmaceutically acceptable salts thereof.

2. The method according to claim 1 wherein the compound is halofuginone.

3. A method for treating or preventing pathological processes related to alterations in gene expression during fibrotic processes, comprising administering to an individual in need thereof a pharmaceutical composition comprising a therapeutically effective amount of a compound having the formula:



wherein: n=1-2

R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;
R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and
R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl,
and pharmaceutically acceptable salts thereof.

4. The method according to claim 3 wherein the compound is halofuginone.

5. The method according to claim 3 wherein the gene expression includes at least one gene selected from:
IGFBP-1 - Insulin like growth factor binding protein 1
IGFBP-3 - Insulin like growth factor binding protein 3
PRL-1 (PTP4A1)- protein tyrosine phosphatase 4A1
APO-AIV - Apolipoprotein A- IV precursor
PI 3-kinase p85-alpha subunit
MAP kinase p38 - Mitogen activated protein kinase p38
Proteasome component C8
E-FABP - Epidermal fatty acid-binding protein
PMP- peripheral myelin protein (PMP-22/SR13)
PCNA - proliferation cell nuclear antigen
Proteasome activator rPA28 subunit alpha
c-K-ras 2b proto-oncogene
ST2A2 - Alcohol sulfotransferase A, Probable alcohol sulfotransferase
TIMP-2 - Metalloproteinase inhibitor 2 (Precursor), Tissue inhibitor of metalloproteinase 2
MMP-3 - metalloproteinase 3
MMP-13 -metalloproteinase 13

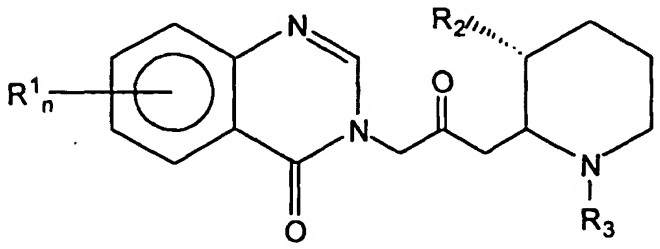
6. The method according to claim 3 wherein the gene is a member of the IGFBP family.

7. The method according to claim 6 wherein the gene is IGFBP-1.

8. The method according to claim 5 wherein the gene is IGFBP-3.

9. The method according to claim 3 wherein the fibrotic process is liver fibrosis.

10. A method for treating or preventing pathological processes related to toxin induced alterations in gene expression comprising administering to an individual in need thereof a pharmaceutical composition comprising a therapeutically effective amount of a compound having the formula:



wherein: n=1-2

R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;

R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and

R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl, and pharmaceutically acceptable salts thereof.

11. The method of claim 10 wherein the toxin is thioacetamide (TAA).

12. The method according to claim 10 wherein the compound is halofuginone.

13. The method according to claim 10 wherein the gene expression includes at least one gene selected from:

IGFBP-1 - Insulin like growth factor binding protein 1

IGFBP-3 - Insulin like growth factor binding protein 3

PRL-1 (PTP4A1)- protein tyrosine phosphatase 4A1

APO-AIV - Apolipoprotein A- IV precursor

PI 3-kinase p85-alpha subunit

MAP kinase p38 - Mitogen activated protein kinase p38

Proteasome component C8

E-FABP - Epidermal fatty acid-binding protein

PMP- peripheral myelin protein (PMP-22/SR13)

PCNA - proliferation cell nuclear antigen

Proteasome activator rPA28 subunit alpha

c-K-ras 2b proto-oncogene

ST2A2 - Alcohol sulfotransferase A, Probable alcohol sulfotransferase

TIMP-2 - Metalloproteinase inhibitor 2 (Precursor), Tissue inhibitor of metalloproteinase 2

MMP-3 - metalloproteinase 3

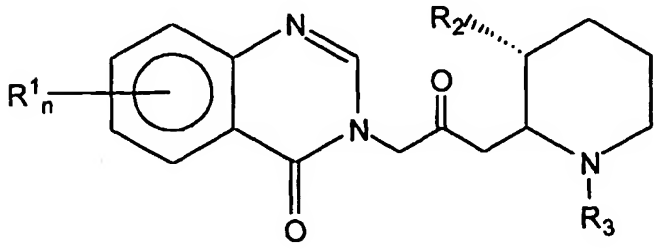
MMP-13 - metalloproteinase 13

14. The method according to claim 10 wherein the gene is a member of the IGFBP family.

15. The method according to claim 14 wherein the gene is IGFBP-1.

16. The method according to claim 14 wherein the gene is IGFBP-3.

17. A method for treating hepatic cirrhosis by increasing the IGFBP-1 expression in hepatocyte cells comprising administering a pharmaceutical composition comprising a therapeutically effective amount of a compound having the formula:



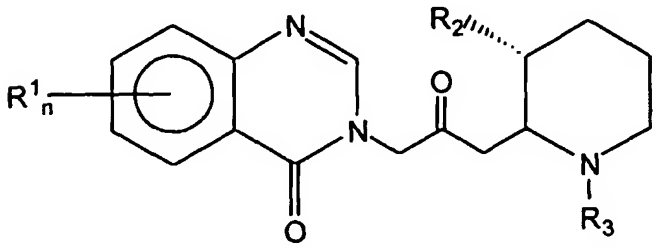
wherein: n=1-2

R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;

R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and
R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl, and pharmaceutically acceptable salts thereof.

18. The method according to claim 17 wherein the compound is halofuginone.

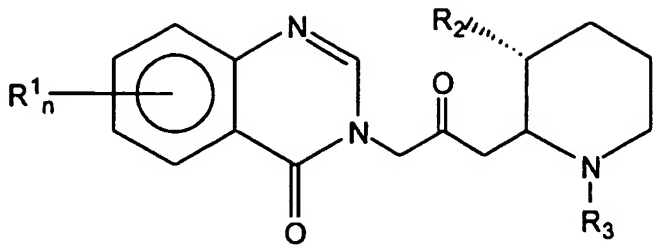
19. A method for improving liver regeneration by increasing the IGFBP-1 expression in hepatocyte cells comprising administering a pharmaceutical composition comprising a therapeutically effective amount of a compound having the formula:



wherein: n=1-2
R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;
R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and
R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl, and pharmaceutically acceptable salts thereof.

20. The method according to claim 19 wherein the compound is halofuginone.

21. A method for improving the capacity of a cirrhotic liver to regenerate following partial hepatectomy by inducing gene expression of at least one gene selected from IGFBP-1, PRL-1, MMP-3 and MMP-13 comprising administering a pharmaceutical composition comprising a therapeutically effective amount of a compound having the formula:



wherein: n=1-2

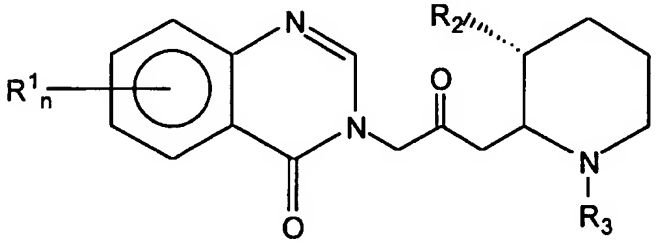
R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;

R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and

R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl; and pharmaceutically acceptable salts thereof.

22. The method according to claim 21 wherein the compound is halofuginone.

23. A method for improving the capacity of a cirrhotic liver to regenerate following partial hepatectomy by affecting the molecules in the signal transduction pathway of hepatocyte growth factor (HGF), comprising administering to an individual in need thereof a pharmaceutical composition comprising a therapeutically effective amount of a compound having the formula:



wherein: n=1-2

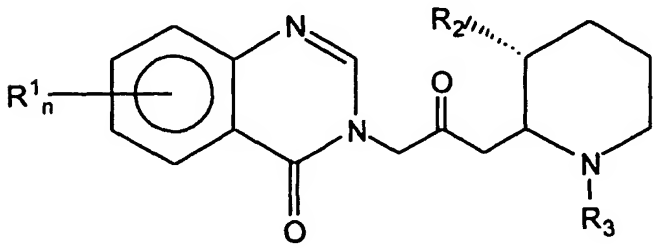
R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;

R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and

R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl; and pharmaceutically acceptable salts thereof.

24. The method according to claim 23 wherein the compound is halofuginone.

25. A method for increasing the amount of biologically active IGF-1, comprising administering to an individual a pharmaceutical composition comprising a therapeutically effective amount of a compound of the general formula:



wherein: n=1-2

R_1 is at each occurrence independently selected from the group consisting of hydrogen, halogen, nitro, benzo, lower alkyl, phenyl and lower alkoxy;

R_2 is a member of the group consisting of hydroxy, acetoxy and lower alkoxy; and

R_3 is a member of the group consisting of hydrogen and lower alkenoxy-carbonyl; and pharmaceutically acceptable salts thereof.

26. The method according to claim 25 wherein the compound is halofuginone.